Light and Lighting

Official Journal of the Illuminating Engineering Society.

Incorporating "The Illuminating Engineer."

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It's All One Problem . . .

STREET Lighting, Automobile Headlights, Cycle Rear Lamps, Traffic Lights—they should all help each other and should be considered *jointly*.

This was well illustrated by the admirable joint meeting, on February 27, of the Institution of Automobile Engineers and the I.E.S. Birmingham Centre (see p.35).

Dr. J. H. Nelson gave an address summarising much of his recent paper in London. Mr. J. M. Waldram spoke of glare in street lighting, and its avoidance.

The joint effects of illumination provided by street lighting systems and illumination furnished by motor-car headlights should also be considered. If one is good can we dispense with the other? Do they, in fact help or hinder each other? (It has been declared that the beam of a headlight, which lights up objects on the roadway, and modern street lighting, which shows them in silhouette against the road brightness, are attempting opposite things, and are mutually destructive.)

In our arrangements for the future let us have all these aspects studied together. Let us have done with piecemeal regulations dealing spasmodically with each in turn.

National Illumination Committee

The annual meeting of the National Illumination Committee, held on March 15, was notable because of the resignation of the Earl of Mount Edgcumbe from the position of chairman. The Earl of Mount Edgcumbe has represented the Institution of Electrical Engineers since the National Committee was formed in 1913, and became one of the vice-chairmen in 1919, his colleague being Mr. John Bond. In the following year, Mr. A. P. Trotter resigned from the chairmanship and the Earl of Mount Edgcumbe was elected to occupy the position, which he has filled with particular distinction until now.

He led the British representatives at the first meeting of the International Commission on Illumination in Paris in 1921 and he has, of course, been the leader at subsequent international meetings until the last to be held in Holland in June, 1939. The Earl of Mount Edgcumbe is further the representative of this country on the Executive Committee of the I.C.I.

By unanimous agreement, Dr. J. W. T. Walsh was elected to be the new chairman; Dr. Walsh has been the representative of the National Physical Laboratory for a number of years.

Lectures To Schoolchildren

The lectures to schoolchildren on the wonders of lighting, which proved so successful in Bradford and have since been repeated in Leeds and London, has induced the Newcastle Centre to arrange something similar in the north-eastern area. Lectures have so far been given at the Heaton Secondary School, St. Cuthbert's Grammar School, Gateshead Secondary School, and Rutherford, and various other technical colleges, the audiences in general being of the order of 250-300. The lecturers were Mr. E. C. Lennox and Mr. P. S. J. Underwood; Mr. S. D. Lay and Mr. W. Sancto also assisted with demonstrations. We understand that they were thoroughly appreciated, and requests for five additional lectures have since been received.

International Lighting Exhibition Postponed

Much interest has been excited in the United States by the announcement of the International Lighting Exhibition ("What's New in Lighting") which was planned to take place in Chicago next month. It is now announced that in deference to the desire of the Government to reduce travel resulting from conventions and exhibitions the event is to be postponed. Whilst the display would have served a useful purpose in drawing public attention to the value of good lighting in relation to the war effort, the decision was no doubt inevitable in present circumstances.

Forthcoming I.E.S. Meetings

(Provisional List)

SESSIONAL MEETINGS IN LONDON

1945.

April 18th. Mr. R. Maxted and Mr. J. N. Hull on **"Circuits for Discharge Lamps."** *(At the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, Victoria Embankment, London, W.C.)* **5.30 p.m.**

May 15th. Annual General Meeting, followed by an Address by Dr. W. R. G. Atkins, F.R.S., on **Daylight and its Penetration into Sea Water.** *(In the Lecture Theatre of the Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W.1.)* **5.30 p.m.**

MEETINGS OF CENTRES AND GROUPS

1945.

April 4th. Annual General Meeting of Newcastle Centre. *(In the Minor Hall, Oxford Street, Newcastle-on-Tyne.)* **5.30 p.m.**

April 6th. Mr. R. G. Williams on **Stage Lighting.** *(In Bristol.)* **5.30 p.m.**

April 6th. Mr. S. W. Richards on **Lighting in Hazardous Situations.** *In the Lecture Theatre of the City of Nottingham Gas Department, Parliament Street, Nottingham.)* **5.30 p.m.**

April 9th. Mr. K. Oldham on **Neon Signs.** *(In the Leeds Corporation Electricity Showrooms, The Headrow, Leeds.)* **6 p.m.**

April 9th. Mr. A. Lowson on **Infra Red Design.** *(In the Nether Chapel, Norfolk Street, Sheffield.)* **6 p.m.**

April 10th. Mr. S. C. McDiarmid on **The Development of Lighting Fittings.** *(In the Electricity Showrooms, Market Street, Huddersfield.)* **7 p.m.**

April 10th. Address by The President (Mr. E. Stroud.) *(In the Corporation Electricity Showrooms, Liverpool.)* **2.30 p.m.**

1945.

April 10th. Mr. F. L. Cator on **What is Lighting Worth?** *(In The Electricity Department Demonstration Theatre, Charles Street, Leicester.)* **6 p.m.**

April 12th. Mr. O. C. Wayland on **The Lighting of Large Stores.** *(In the Electricity Showrooms, Sunbridge Road, Bradford.)* **6.45 p.m.**

April 12th. Mr. G. C. Quilliam and Mr. M. C. Williams on **Some Aspects of Lighting by The Architect.** *(At the Cardiff Corporation Demonstration Theatre, The Hayes, Cardiff.)* **4.30 p.m.**

April 27th. Address by The President (Mr. E. Stroud.) *(At the Imperial Hotel, Temple Street, Birmingham.)* **6 p.m.**

May 1st. Mr. F. L. Atkin on **Infra Red Drying.** *(In the Electricity Corporation Department Demonstration Theatre, Charles Street, Leicester.)* **6 p.m.**

May 3rd. Annual General Meeting of Cardiff Centre. *(In the Cardiff Corporation Demonstration Centre, The Hayes, Cardiff.)* **3.30 p.m.**

May 4th. Annual General Meeting of Bath and Bristol Centre, followed by an Address by Mr. W. Imrie Smith on **Special Industrial Lighting.** *(In the Pump Rooms, Bath.)* **7 p.m.**

May 8th. Annual General Meeting of Sheffield Centre. Address by The President (Mr. E. Stroud.) *(At the Nether Chapel, Norfolk Street, Sheffield.)* **6 p.m.**

May 29th. Mr. E. P. Mawson on **Lighting and Leisure.** *(In the Electricity Showrooms, Market Street, Huddersfield.)* **7 p.m.**

June 5th. Dr. A. B. Whitworth on **Electric Lamp Manufacture.** *(In the Electricity Department Demonstration Theatre, Charles Street, Leicester.)* **6 p.m.**

Other Forthcoming Events

The attention of I.E.S. Members is drawn to the following forthcoming meeting, to which they are cordially invited :—

April 12th. Mr. R. O. Ackerley on **Factors Influencing the Design of Electric Lighting Installations for Building Interiors.** *(Installation Section Meeting of the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2.)* **5.30 p.m.**

(Secretaries of Centres and Groups are requested to send in particulars of any changes in programmes, mentioning subject, author, place, date and time of meeting; summaries of proceedings at meetings (which should not exceed about 250-500 words) and any other local news are also welcome.)

Interior Design in Buildings and Artificial Illumination

Proceedings at the Joint Meeting of the Illuminating Engineering Society and the Royal Society of British Architects, held in the Lecture Theatre of the Institution of Mechanical Engineers, Westminster, on February 27th, 1945.

The joint I.E.S.-R.I.B.A. meeting held on February 27, the second of its kind recently initiated, was, like the similar gathering in 1944, a definite success. It is greatly to be hoped that such a meeting will become a recognised annual event in the programmes of the two bodies.

The 1944 meeting, held at the R.I.B.A., was aided considerably by Mr. Ackerley's appealing demonstrations and the characteristic pleasant manner in which they were presented. The second gathering was a somewhat severe test: first, because it was in the nature of a "return match," not "played on the home ground" and, secondly, because the subject matter was essentially technical. The success of this second meeting is to be ascribed largely to the fact that the choice of the lecturer was again a very happy one. Dr. Walsh not only marshalled his data skilfully and lucidly, but contrived to make it interesting even to those illuminating engineers who might be assumed to be thoroughly familiar with it—raising quite a number of points that provided good material for discussion.

"Foot-Candle Disease"

In opening his subject, Dr. Walsh recalled the charge once levelled by an architect at illuminating engineers of suffering from "foot-candle disease," and explained that he intended to dispense with this term, speaking only of lumens per square foot. (1/sq. ft.) He also recalled the fundamental requirements stated in the recently published D.S.I.R. study of "The Lighting of Buildings," namely adequate illumination, proper design and placing of light sources, satisfactory direction of light and suitable colour, suitable decoration to ceilings, walls, floors, and furniture, and adequate maintenance.

The aim of the illuminating engineer is to satisfy all these requirements. In his calculations he uses the well-known "lumen method" or "coefficient of utilisation method"—the coefficient of utilisation being defined as "that fraction of the lumens from the lamp which gets to the working plane."

Coefficients of Utilisation

Dr. Walsh explained that the tables for finding this coefficient are divided into two stages. First, the effect of room dimensions is attended to by means of a "room index," computed by observation of tabular data in regard to widths and lengths of rooms and the mounting heights of sources. Next, use is made of other tabular data dealing with reflection factors of walls and ceilings in relation to classification of lighting units in terms of light distribution.

The latest tables appearing in "Modern Factory Lighting" were exhibited. Dr. Walsh also entered into some account of the early pioneering work of Ward Harrison and others, and pointed out how simplification of the original rather complex material had been brought about. The utilisation factor goes up as the size of the room increases and as the mounting height decreases. The effect of room dimensions is usually much less than that of decoration.

Mounting Height

Mounting height is affected by other considerations besides efficiency, e.g., the question of glare. Limits to the brightness of fittings, such as 10 c.p. per sq. inch within a specified range of view, have been suggested.

In modern houses the difficulty in securing adequate mounting height is often considerable, owing to the prevalence of low ceilings. Dr. Walsh advocated mounting lighting units as near to the ceiling as possible, and suggested further, for serious consideration by architects, the provision of recesses in ceilings to accommodate them. Where the ceiling height does not exceed 15 feet, he considered, the best way of mounting discharge lamps is within a few inches of the ceiling and without any form of shade or reflector whatever.

"Built-in Lighting"

Discussions of such problems led next to "built-in" lighting and the use of overhead laylights, which have proved

very useful in blacked-out factories, etc., and to "artificial windows," in which sources of artificial light illuminate evenly a diffusing surface, of which an illustration was shown. The author pointed out the difference between such a window and one admitting natural light. With an artificial window the light is distributed more or less evenly, 50 per cent. reaching the ceiling and the upper part of the walls, whence they are reflected back into the room, and 50 per cent. distributed over the working plane. But in the case of a window admitting natural light, nearly all the light has a downward direction and, as a rule, not more than 10 per cent. reaches the ceiling.

Artificial Windows

Lighting from an artificial window is best studied by dividing the illumination at any point into two parts, viz., the direct and the diffused. The direct component can be calculated by any of the methods used for daylight calculations. The diffused component can be estimated by a method analogous to that used for artificial lighting, i.e., by applying a coefficient of illumination to the upward half of the flux emitted from the window. (Some research is here needed to afford a table of coefficients.) Dr. Walsh illustrated this process by a calculation for a room lighted by a window of specified position and dimensions. (Calculations of light distributed from laylights would be a simple matter if they could be treated as perfectly diffusing, but generally they are not, and much depends on the characteristics of the glass used.)

In general, such windows should be placed as high as possible, as this arrangement tends to minimise glare, gives more even distribution of light and tends to increase the coefficient of utilisation of the upward light. Avoidance of glare is an important consideration in the case of artificial windows in a side wall.

In conclusion, the author emphasised the value of well-designed built-in lighting. The secret of successful design is the *ars celare artem*. The greatest compliment that can be paid by a layman to a lighting engineer is for him to reply to the question, "What did you think of the lighting?" by the words, "Well, now you ask me, I'm afraid I must confess I didn't really notice it."

Brightness Gradation

In the discussion, as might have been expected, some speakers did not fail to point out that "adequate light on the working plane" was only part of the story. Architects were concerned with the general appearance of the room. Mr. W. J. Jones went further and suggested that in the future architects might furnish something in the nature of a wash drawing, showing the gradation of brightness on table, walls, and ceiling, as they wished to see it, on which lighting engineers might base their planning. He also pointed out that utilisation factor tables could not be rigidly applied to very small rooms.

Mr. Hartland Thomas protested against the "artificial window," in the sense of a theatrical imitation provided at a place where no natural window could possibly be, and he and some other speakers seemed to think that the fluorescent tube had not yet been diminished in brightness sufficiently to permit its installation regardless of possible glare.

A Voice from the Past

It was pleasant to see at this meeting a very old member of the Society, Mr. W. E. Bush, who explained that he had only recently returned after four years in a German concentrationn camp, and was therefore somewhat out of touch with recent developments! He expressed his great pleasure at the interest shown by architects in this meeting. He recalled his own predictions, 20 years ago, of illuminations much higher than those then ruling. He now urged architects not to repeat the mistakes of the past, but to allow for even higher illuminations in time to come.

Repetition of I.E.S. Lectures

Repetition of outstanding papers and addresses before several I.E.S. Centres is becoming quite usual. Dr. Starkie's paper on Plastics in Lighting, originally given before the Bath and Bristol Centre, was repeated on February 14 before a joint meeting of the I.E.S. Glasgow Centre and the Institute of Plastics; Mr. J. M. Waldram has recently lectured on street lighting before the Birmingham Centre (February 27) and the Edinburgh Group (March 2); Mr. R. O. Ackerley and Mr. Alister MacDonald have just repeated their talk on "The Place of Science in the Art of Lighting" (originally staged at the joint I.E.S.—R.I.B.A. meeting in London on January 18, 1944) in Edinburgh. Similarly Mr. J. N. Aldington has lectured on "Bright Light Sources" both in London and Liverpool.

Electrical Lighting Installation Problems

A practical and informative paper on the above subject was read by Mr. W. Hartley at the meeting of the I.E.S. Manchester Centre on March 8.

The first point stressed by the author was the high initial current—which may be ten times the final current—when tungsten lamps are switched on. This may well give rise to trouble when, say, six 300 w. 230 v. lamps, taking initially 78 amperes, are controlled by an ordinary 15 amp. tumbler switch.

In preparing lighting layouts the use of three-phase and neutral balanced systems, which serve to reduce voltage drop should be encouraged. Looping of the wiring should not be insisted upon.

"Too much fuss is made about the skill and knowledge required for designing a lighting installation." In large works the problem is usually simple. The higher the mounting height the easier the problem, but access to fittings must be afforded either by a crane (beneath which two lighting units should be fixed to avoid shadows) or by placing the lighting points adjacent to roof ties or trusses, convenient for the use of ladders. Types of units permitting the removal of the reflector part without disturbing the lamp are desirable. Some variation in spacing is often of no great moment and sometimes essential—in examining plans it has on occasion been found that units are located in the middle of skylights, open-roof spaces, etc.! Differences in performances of individual units may be quite as great as those caused by variation in spacing. In practice a variation up to 33 per cent. of the maximum illumination is not usually noticeable and should be permitted—provided, of course, that the necessary minimum is achieved.

High intensity direct general lighting is always objectionable when head room is limited, e.g., when illuminations of 20 ft.c. or more are provided from units at heights under 10-11 feet. It is much better to provide general lighting to the minimum standard, and to use well-screened local units, run with advantage off transformers. As much as 50 ft.c. can easily be obtained from 15 w. or 20 w. lamps. Such arrangements are definitely more economical than high general illumination. The ratio between the high local illumination and the surrounding general value should not, however, exceed about 5 to 1.

The lighting of salt-drying chambers and linoleum-drying rooms is difficult owing to the high temperature (150 deg. or even 200 deg. F.), which makes the use of standard cable impracticable; installations operating at 25 v. using bare wires, suitably painted, with enclosed lighting fittings, have been adopted in such cases. In general the author finds that discharge lighting (both sodium and mercury) is disliked owing to the peculiar colour of the light, though mercury vapour lighting seems to have special advantages in foundries.

The advantages of the 80 w. fluorescent tube are familiar and evident. Improvement in fittings and reflectors is, however, needed, and the high initial cost is often a serious drawback. Stroboscopic effects may be found in certain cases, e.g., in card-rooms in cotton mills, where the use of twin-tube lighting units with phase-displacing condensers, or three-phase lighting with units connected alternately to the respective phases are advantageous. In drawing offices the author advises the mounting of fluorescent units along an overhead line about one foot from the near edge of the drawing-board. This enables 25 ft.c. to be obtained with units 5-6 ft. above the board and eliminates possible trouble owing to direct reflections off glossy surfaces.

Street Lights and Headlights

A very successful joint meeting with the Birmingham Centre of the Institution of Automobile Engineers was arranged by the I.E.S. Birmingham Centre on February 27, when papers were read by Mr. J. M. Waldram ("Street Lighting") and Dr. J. H. Nelson ("Automobile Headlights"). There was a very representative audience of about 240 people, which included Sir Arnold Musto, the Midlands Regional Transport Commissioner, Brigadier C. R. Bennett (War Office), Mr. W. C. Johnson, Chief Constable of Birmingham, and others interested in traffic problems.

The meeting afforded an excellent opportunity for motoring experts to become conversant with the standpoint of the public lighting engineer and for the latter to visualise some of the motorist's problems.

Mr. J. M. Waldram, in his analysis of street lighting, explained the modern conception of uniform brightness of the road surface, and the mingling of the "T-shaped" bright patches to approach this condition. He also referred to systems using a "cut-off" at the lantern, which may avoid glare almost completely but at the cost of short spacing, more numerous light sources and rather less revealing power. It is unfortunate that the most useful portion of the bright patch, the "tail," caused by rays slightly below the horizontal, is also the most productive of glare, Mr. Waldram, however, distinguished between "disability" and "discomfort" glare, and contended that the former variety, the most serious, can be reduced within narrow limits by appropriate design.

Dr. Nelson's address was on similar lines to that recently given in London. He, too, pointed out that discomfort in regard to dazzle does not necessarily mean inability to see. Some glare is inevitable, and a compromise between revealing power and comfort is necessary. In this connection Dr. Nelson sketched possible future legislation limiting the main driving beam to 1,000 lumens in each lamp, which, however, would not be used when passing another vehicle; for this purpose an "authorised passing beam" would be specified. At present the "non-dazzling" lamp does not exist, a flat-topped beam has great limitations, and the use of polarised light, whilst a future possibility is not yet practicable.

In the discussion, which was opened by Mr. Wilfred Lund, some interesting points were made. Amongst these were the education of drivers to look at the road but not the lights, the use of studs to reveal crossings, etc., the selection of road surfaces having good lighting and non-skid properties, and the recognition that advantages ascribed to light of some special colours in fog are mainly mythical.

Obituary

SIR DUNCAN WILSON

The sudden death on March 1 of Sir Duncan Wilson deprives the Illuminating Engineering Society of one of its most distinguished and esteemed past presidents. His period of office (1927-28) coincided with the death of the founder of the Society, Mr. Leon Gaster, and the Society owes much to his help and guidance at that time.

To members generally Sir Duncan was best known for his enlightened interest in and profound knowledge of industrial lighting, based on practical experience dating from his appointment as a factory inspector in 1904. His reports as Chief Inspector, from 1932 onwards, contained frequent references to the subject. He was one of the joint secretaries of the original Departmental Committee on Lighting in Factories and Workshops, which reported in 1915, 1921, and 1922. Later he served as chairman of the reconstituted Committee when it resumed its work, and had the satisfaction of seeing a general requirement of adequate and suitable lighting — which he had repeatedly recommended many years previously— introduced into the Factory Act of 1937.

He guided the Committee in the preparation of its familiar fourth and fifth reports. He was associated with the Illumination Research Committee, set up under the Department of Scientific and Industrial Research, which was responsible for many valuable researches. When, after the outbreak of war, the National Industrial Electric Lighting Service was created to deal with problems connected with the re-lighting of factories engaged in the national effort, he accepted the chairmanship of its main committee.

Up to the end Sir Duncan maintained a keen interest in the work of the Society and frequently attended meetings. He united with sound judgment and sagacity a most genial and kindly disposition which endeared him to all with whom he came in contact, and never failed to bring out the best efforts of committees over which he presided.

National Illumination Committee of Great Britain

(Affiliated to the International Commission on Illumination)

Constitution of the Committee on December 31st, 1944

NOMINATED BY THE CONTRIBUTING ASSOCIATIONS:—

Illuminating Engineering Society: R. O. ACKERLEY, DR. H. BUCKLEY, J. S. DOW, PROFESSOR T. DAVID JONES, L. H. MCDERMOTT.

Institution of Electrical Engineers: EARL OF MOUNT EDGCUMBE, P. GOOD, PROFESSOR J. T. MACGREGOR-MORRIS, DR. C. C. PATERSON, J. W. TOWNLEY.

Institution of Gas Engineers: J. E. DAVIS, G. DIXON, E. V. EVANS, W. HODKINSON, F. C. SMITH.

NOMINATED BY THE CO-OPERATING ASSOCIATIONS:—

Admiralty: W. C. M. COUCH.
Air Ministry: C. B. COLLINS, M. LATIN.
Association of Public Lighting Engineers: E. J. STEWART.
British Commercial Gas Association: D. CHANDLER.
British Electrical and Allied Manufacturers' Association: C. RODGERS.
British Electrical Development Association: V. W. DALE.
Department of Scientific and Industrial Research: (*National Physical Laboratory*) T. SMITH, DR. J. W. T. WALSH.
Electric Light Fittings Association: G. CAMPBELL, DR. S. ENGLISH.
Electric Lamp Manufacturers' Association: W. J. JONES, C. W. SULLY.
Glass Manufacturers' Federation: E. J. C. BOWMAKER, G. MARCHAND.
Home Office: E. W. MURRAY.
Incorporated Municipal Electrical Association: E. J. JARVIS.
Industrial Health Research Board: H. C. WESTON.
Institution of Municipal and County Engineers: E. J. ELFORD.
Medical Research Council: Dr. H. HARTRIDGE.
Ministry of Health: A SCOTT.
Ministry of Supply: COL. SILVESTER EVANS.
Ministry of Transport: E. S. PERRIN.
Ministry of Works: G. SMITH.
National Gas Council: G. DIXON.
Post Office: SIR HENRY BASHFORD, H. W. FULCHER.
Railway Clearing House: M. G. BENNETT, A. CUNNINGTON.
Society of British Gas Industries: R. J. ROGERS, H. R. STEVENSON, CRAWFORD SUGG.
Society of Glass Technology: DR. B. P. DUDDING.

OFFICERS:—

Chairman: EARL OF MOUNT EDGCUMBE.

Vice-Chairmen: DR. C. C. PATERSON and F. C. SMITH.

Hon. Treasurer: Dr. C. C. PATERSON, Research Laboratories of the General Electric Co., Ltd., Wembley, Middlesex.

Hon. Secretary: L. H. MCDERMOTT, The National Physical Laboratory, Teddington, Middlesex.

Representatives of Great Britain on the Executive Committee of the International Commission on Illumination:—

EARL OF MOUNT EDGCUMBE and DR. H. BUCKLEY.

ANNUAL REPORT FOR THE YEAR 1944

(Presented at the Annual Meeting of the Committee held on Thursday, March 15th, 1945)

After a long period, during which the work has been largely suspended, the National Committee is now slowly resuming its activities.

At the Special Annual Meeting, Mr. Good gave an account of his discussions in the U.S.A. on the subject of international standardisation and how it was

likely to affect the future of the National Committee.

The Annual Meeting was instrumental in inaugurating a renewal of the activities of the Mine Lighting Sub-committee, which had to some extent been re-formed in 1940, with Mr. J. Ivon Graham as Chairman. During the last year a further increase in membership and consequent widening of scope have been effected. At the first meeting of the enlarged Sub-committee held in October, a considerable programme of study was inaugurated and Panels were formed to report on the present position of such subjects as mains lighting, the use of glass and "synthetic" glass in mine lighting fittings, the deterioration of accumulators and the distribution of light from various types of lamp.

Work has now been restarted on the revision of the Street Lighting Specification (B.S. 307), which had received considerable attention before the outbreak of war. The question has now arisen as to whether a Code of Practice should take the place of the Standard Specification, but it has been finally agreed by a considerable majority to retain the specification with the addition of fairly extensive explanatory notes.

The Sub-committee which was appointed to consider in detail the clause on light distribution and the method of measuring it, has found what appears to be a satisfactory solution, and has nearly completed its draft, which it is hoped will in addition enable the question of maintenance to be dealt with satisfactorily.

The Sub-committee on Aerodrome Lighting has also been restarted, but at present is awaiting further information from the Civil Aviation Department of the Air Ministry.

An attempt is being made to co-ordinate the specifications of the colours in the British Standards for aerodrome lighting, traffic control signals, railway signals, and lighthouse intensities. Considerable research work has been carried out, and it is hoped that a satisfactory agreement can be reached.

A revision of the three specifications for portable photometers has been completed and is being circulated for comment.

The B.S.I. Committee on Lighting Fittings has reviewed the specifications coming within its purview. Slight modifications have been made to the specification for Vitreous Enamel Reflectors (B.S. 232), but further information is being awaited on the reflection qualities and durability of the vitreous enamel from the Committee in the Chemical Section dealing with this subject.

In connection with the specification for the Classification of Light Distributions (B.S. 398), the Industry is being consulted with regard to the issue of a revision based on dispersive angle instead of frame ratio, which was completed before the war.

It has been recommended by the Study Committee on Illumination appointed by the D.S.I.R. that the scope of the specification for the Study Lamp (B.S. 710) should be widened to include reading lamps generally. The Electric Light Fittings Association have agreed to this recommendation. The Study Committee on Illumination has also recommended that a specification be prepared for domestic lighting fittings to amplify the Code of Practice which is being issued on this subject: the matter is under discussion.

A request has been received from the glass manufacturers for a specification for ordinary well glass fittings other than those used for flame-proof purposes. This is now under consideration.

A proposal has been received from the Ministry of Aircraft Production for the revision of the types of lamps included in B.S. 161, whilst a proposed modification to B.S. 1,050 (Visual Indicator Lamps) to bring it into line with the latest G.P.O. specification for telephone lamps has been submitted to the Electric Lamp Manufacturers' Association.

It is with regret that the Committee has to record the death of Mr. F. J. Gould, one of the representatives of the Society of British Gas Industries. His place has been taken by Mr. H. R. Stevenson. Other changes of membership which have occurred are the replacement of Mr. E. C. Hyde by Mr. M. Latin as the representative of the Air Ministry, the nomination by the Institution of Gas Engineers of Mr. W. Hodkinson to occupy the place of the late Mr. S. Lacey, and also the replacement of Dr. S. English, now representing the Electric Light Fittings Association, by Prof. T. David Jones, as a representative of the Illuminating Engineering Society.

MOUNT EDGCUMBE,
Chairman.

Colour Printing

The nineteenth meeting of the Colour Group, held on February 7, was somewhat different from previous meetings in that there was no formal paper but instead an admirably delivered lecture by a member of the teaching staff of the L.C.C. School of Photo-Engraving and Lithography, Bolt-court. The lecturer, Mr. H. M. Cartwright, F.R.P.S., took as his subject "Colour Printing and Problems of Colour Reproduction," and began by giving an outline of two of the most used methods of colour reproduction, viz., the half-tone and the photogravure. In the former case depth of tone was governed by the size of the dots of which the print was composed; in the latter case it was controlled by the thickness of the ink impression at each part of the picture. For three-colour work there were usually four plates, three of them produced by photographing through three colour filters, each of which covered about one-third of the spectrum. The fourth plate was produced without a filter. Each plate was then printed in an ink which should, ideally, absorb that part of the spectrum transmitted by the filter used in making the plate. The inks available, however, were far from fulfilling this ideal, and compensation had to be introduced by hand re-touching at some stage of the work. To avoid this, various "masking" processes had been proposed, but these, in addition to being difficult to apply, did not give by any means complete correction.

The lecturer went on to say that rotary photogravure under carefully controlled conditions was capable of giving the best results, but re-touching was much more difficult with this process since, in order to ascertain the result of a re-touch, it was necessary to go through the whole printing process to the final picture. With letterpress half-tone, on the other hand, the fine-etching was a much easier process as far as colour correction was concerned, but the final result was not of such good quality on account of the screen texture and the necessity to use a coated paper.

Exhibited in the lecture room were a number of fine examples of pictures reproduced by each of the two processes described by Mr. Cartwright, as well as some produced by the offset-litho and collotype processes, and members examined these at the conclusion of the meeting.

The special problem in colour printing presented by the reproduction of colour-vision tests of the Ishihara type were mentioned by Mr. Cartwright at the end of his lecture. He pointed out that any trichromatic process was clearly inadmissible for work of this kind, and the charts could only be reproduced by making a very large number of printings with specially selected inks. He estimated the number at between 70 and 80.

The lecture, which was given in one of the lecture rooms at the Bolt Court School, was followed by an interesting discussion in which a number of questions were addressed to Mr. Cartwright. For instance, it was pointed out that the half-tone process was, in effect, a combination of an additive and a subtractive mixture. Where the separate dots occurred side by side the mixture would be additive, whereas if they were superimposed it would be subtractive. On this basis the process might be regarded as an eight-colour process. Dr. Wright asked if any attempt had been made to introduce an instrumental control, e.g., by making colorimetric comparisons between the original and the reproduction. The lecturer replied that, as far as he was aware, this had not been done, and it appeared to him that it would be difficult to achieve.

Institute of Physics

Inauguration of South Wales Branch

Physicists employed in industry in South Wales and the surrounding district have for some time felt the need of local opportunities for the interchange of knowledge and experience of Applied Physics. At their request the Board of the Institute of Physics has therefore authorised the formation of a South Wales branch of the Institute which is to be centred on Swansea.

The inaugural meeting of the branch was arranged to take place on March 10, at University College, Swansea (Singleton Park), when Dr. C. Sykes, F.Inst.P., F.R.S., a member of the board of the Institute and principal of the Brown-Firth Research Laboratories, Sheffield, delivered an illustrated lecture on "Physics in Metallurgy."

Further particulars of the branch may be obtained from the acting honorary secretary, Dr. T. V. I. Starkey, A.Inst.P., the Technical College, Mount Pleasant, Swansea.

Literature on Lighting

(Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

(Continued from p. 16, January, 1945)

FUNDAMENTAL PRINCIPLES AND PHOTOMETRY

25. Brightness and Brightness Ratios. I.E.S. Committee on Interior Illumination. Am. Illum. Eng. Soc. Trans., pp. 713-730, December, 1944. The report presents data on the permissible brightness of fittings for interior use, obtained by applying to representative installations Holladay's formula for threshold discomfort glare: Log B + .25 log Q − .3 log F = 1.9 where B = brightness of source in millilamberts; F = brightness of adapting field in millilamberts; Q = solid angle subtended by source. J. S. S.

26. Fluorescent Lamp Light Cell Portable Photometer. G. R. Baumgartner. Am. Illum. Eng. Soc. Trans., pp. 615-619, November, 1944. This photometer, which takes the form of a box adapted to take any standard fluorescent lamp and carrying three photo-electric cells on the side remote from the lamp, has been produced to investigate lamp performance in industrial installations. The instrument compares the average illumination from the lamp under test on the cells with that from a standard lamp of the same type. It is claimed that the accuracy is good enough for field measurements. J. S. S.

27. A Recording Micro-photometer—Its Application to the Design of Reflector-Type Gunsight. F. E. Carlson, W. M. Potter. Am. Illum. Eng. Soc. Trans., pp. 754-767, December, 1944. A description is given of an auto-collimating photo-electric photometer, and of its use in exploring the brightness of the illuminated reticule of a gunsight for various eye positions. J. S. S.

28. On the Geometry of Colour-Space. Domina E. Spencer. Frank. Inst. J. 236, p. 293, September, 1943. The C.I.E. method of colour specification is described, and the use of co-ordinates, leads to a geometrical conception of colour inter-relationship. The treatment is very mathematical. The use of a scale in which the minimum discernible change is represented always by the same displacement of the point in the colour co-ordinate system is described, and a suggestion is made to enable the inclusion of the effect of adaptation of the eye on apparent colour. S. S. B.

29. Colour Control of Surface Coatings with Master and Working Standards of Colour. W. C. Granville. Am. Illum. Eng. Soc. Trans., pp. 818-824, December, 1944. The use is urged of spectrophotometry for obtaining a permanent record of standards for the control of the colour of packaged goods, to avoid troubles due to fading of the standards during their life. J. S. S.

SOURCES OF LIGHT

30. Recent Developments in Light Sources. Preston S. Millar. Elect. Engineering, 63, p. 126, April, 1944. Recent advances in the field of illumination, by the use of new sources of light (including u.v. and infra-red radiation), before the war and the probable post-war developments and applications are described. Arc, tungsten filament incandescent, radiant heating, mercury vapour discharge, sodium vapour discharge and fluorescent lamps are discussed in detail. S. S. B.

31. Trends in High Intensity Mercury Lamps. George A. Freeman. Elect. Engineering, 59, p. 444, November, 1940. Details are given of various types of high-pressure mercury vapour discharge lamps, as produced in America. These include types using hard glass and quartz envelopes, and the water-cooled lamp. The development of a special glass for the seals and of the use of thorium as the emissive material at the electrodes are described, as well as an unusual method of preparing fused

SITUATIONS VACANT

TECHNICAL LIGHTING ASSISTANT required in London by large lamp manufacturers, to prepare lighting schemes for war applications, factories, public lighting, etc. Electrical and lighting experience and technical correspondent essential. Permanent position with post-war prospects for young man free of National Service obligations. Write stating age, qualifications, experience and salary required to Box No. 350, "Light and Lighting," 32, Victoria-street, London, S.W.1.

ELECTRIC LAMP FACTORY requires experienced works Chemist for its small, but well equipped, laboratory. If possible some knowledge of Fluorescent Tubular Lamps. Good prospects for the right man. The factory has good foreign connections with large research laboratories. Applications invited to Box No. 451, "Light and Lighting," 32, Victoria-street, London, S.W.1.

quartz by treatment of an ordinary type of glass. S. S. B.

LIGHTING EQUIPMENT

32. Control Equipment for Discharge Lamps. C. W. Kronmiller. Am. Illum. Eng. Soc. Trans., pp. 849-864, December, 1944. Diagrams and descriptions for many control circuits for discharge lamps are given, with particular reference to fluorescent lamps. J. S. S.

33. An Electronic Relay for Initiating Vapour Discharges. Edward C. Dench. Elect. Engineering, 59, p. 461, November, 1940. A description is given of the principle of working of the "glow-discharge" starting device used in one form of circuit for the tubular fluorescent discharge lamp. S. S. B.

34. Dim-out Control for Window Lights. G. E. Bishop. El. World, 121, p. 1,630, April 29, 1944. A circuit is described for remote control of lighting, applied originally to shop-window lights, and used in Santa Cruz, U.S.A. A pilot control circuit, energised at 20 volts, is required; an advantage of the low voltage is that surface wiring on buildings is permitted. S. S. B.

35. Aircraft Signal Systems. Raymond A. Rugge. Elect. Engineering, 63, p. Trans. 3, January, 1944. The author states three fundamental requirements of aircraft signal indicators, and discusses existing devices, especially in relation to the extent to which they comply with these principles. Signal system methods for aiding the pilot are suggested; and a strong recommendation is made that all signals used should be light-signals, bright enough to be seen under strong sunlight, but arranged with automatic dimming according to the daylight intensity, or night operation. S. S. B.

36. Optical Light Hood for Die Inspection. Anon. El. World, 121, p. 356, January 22, 1944. Details are given of a lighting device, designed for the inspection of relatively narrow recesses with polished wall surfaces, such as closed-end holes. It has proved successful with holes up to 1½ inches in depth of ½ inch diameter. S. S. B.

APPLICATIONS OF LIGHT

37. Progress Report. I.E.S. Committee on Progress. Am. Illum. Eng. Soc. Trans., 687-712, December, 1944. A survey of progress in illuminating engineering in America in 1944 is presented; particular attention is given to fluorescent lamps and fillings. J. S. S.

38. Modern Lighting Practice. Anon. Am. Illum. Eng. Soc. Trans., pp. 587 and 588, November, 1944. Some representative lighting schemes are described with photographs. J. S. S.

39. Trend in Aviation Lighting. W. T. Harding. Am. Illum. Eng. Soc. Trans., pp. 801-817, December, 1944. The author discusses the requirements of aerodrome lighting for night or fog landings on concrete runways, and suggests that boundary lights, floodlights and obstruction lights (except in the landing channels) are useless. A system of approach and runway lighting, using highly directional units some 2 ft. to 3 ft. high is described, and it is said that service tests have shown the system to be very satisfactory, the projection of the fittings above ground being no great danger. J. S. S.

40. Mercury Vapour Street Lighting in Denver. D. W. Rowten. Am. Illum. Eng. Soc. Trans., pp. 731-753, December, 1944. The author describes the relighting of the entire street system of Denver. Most of the lamps used are 400 watt high-pressure mercury vapour lamps, at 25 ft. or greater mounting height. Numerous photographs are given. J. S. S.

41. Lighting of an Airplane Plant at Budd Field. J. L. Kilpatrick, L. N. Blugerman. Am. Illum. Eng. Soc. Trans., pp. 768-800; December, 1944. The author describe alternative schemes and compare costs of lighting a very large assembly plant having a concrete vaulted roof. Totally indirect lighting was adopted, provided by 3 kw. mercury vapour and 750 watt filament lamps in floodlights fixed to an axially disposed cat walk suspended 17 ft. below the 58 ft. high roof. Details of design, costs, maintenance and performance are given. J. S. S.

42. Lighting a Gage Laboratory. W. S. Mowry. Am. Illum. Eng. Soc. Trans., pp. 602-609, November, 1944. The lay-out and fittings of a fluorescent lamp installation in the Gauge Section of the Boston District Ordnance Department are described. The max. brightness of fittings and the min. ceiling brightness are 350 e.f.c. and 100 e.f.c. respectively, and photographs illustrate the advantages of this low brightness range. The average illumination is 115 f.c. J. S. S.

43. What Price Industrial Eye Comfort. W. G. Darley, A. K. Gaetjens. Am. Illum. Eng. Soc. Trans., pp. 825-848, December, 1944. A full discussion of the factors producing visual discomfort and depression in the lighting of industrial premises is given. Useful data on the effect of louvres in fittings for fluorescent lamps is presented. J. S. S.